

REMARKS

As a preliminary matter, please note the following corrections to the remarks section of the previous amendment submitted 22 December 2000. In the first sentence of the last paragraph on page 17, "Jones' other having segmented shutter appears displays to utilize light" should read "Jones' other displays having segmented shutters appears to utilize light". In the next-to-last paragraph on page 20, "light-emissive", each of the three occurrences, should read "light emissive".

Turning to the present amendment, Claims 1, 42, 44, 46, 49 - 51, 54, 57, 97, 98, 125, and 127 have been amended. Claims 41, 43, 45, 48, and 53 have been cancelled. Claims 131 - 154 have been added. This includes the re-instatement of Claim 5, previously cancelled¹, as new Claim 131. Accordingly, Claims 1 - 4, 6 - 40, 42, 44, 46, 47, 49 - 52, 54 - 59, and 66 - 154 are now pending.

Claims 1 - 12, 15 - 21, 28, 29, 40 - 44, 57 - 59, 125, and 127 have been rejected under 35 USC 103(a) as obvious based on Jones et al, U.S. Patent 5,175,637 ("Jones")². Claims 13, 14, and 22 - 27 have been rejected under 35 USC 103(a) as obvious based on Jones in view of Nakamoto, U.S. Patent 6,031,328. Claims 30 - 39 and 63 - 65 have been rejected

¹ The present Office Action, i.e., the one mailed 11 April 2001, treats Claim 5 as if it were still pending as of the mailing date of the Office Action even though Claim 5 cancelled in the 22 December 2000 amendment. This problem has been mooted by the re-instatement of Claim 5 as Claim 131.

² See footnote 1.

under 35 USC 103(a) as obvious based on Jones in view of Curtin et al, U.S. Patent 5,686,790 ("Curtin 790")³. Claims 45 and 53 have been rejected under 35 USC 103(a) as obvious based on Jones in view of Waters et al, U.S. Patent 4,596,446 ("Waters"). Claims 54 - 56 and 126 have been rejected under 35 USC 103(a) as obvious based on Jones in view of Curtin et al, U.S. Patent 5,576,596 ("Curtin 596").

Claims 66 - 81, 84 - 87, 93 - 97, 124, and 128 - 130 have been rejected under 35 USC 103(a) as obvious based on Jones in view of Bird et al, U.S. Patent 5,483,263 ("Bird").

Claims 82, 83, and 88 - 92 have been rejected under 35 USC 103(a) as obvious based on Jones in view of Bird and Nakamoto. Claims 115 - 123 have been rejected under 35 USC 103(a) as obvious based on Jones in view of Bird and Curtin 790.

Claim 98 has been rejected under 35 USC 103(a) as obvious based on Jones in view of Bird and Waters. These rejections are respectfully traversed in view of the amendments to the claims.

More particularly, dependent Claims 46 - 52 and 99 - 114 have been indicated as being allowable if rewritten in independent form. Subject to deletion of the limitation that "largely all of the image part produced by the light provided by each imaging line" is "displayed largely simultaneously at any time when that image part is being displayed", independent Claim 1 has been rewritten to include the further limitations of dependent Claims 41, 43, 45, and 48, all now cancelled. Taking note of the fact that Claim 48 is one of the claims

LAW OFFICES OF
SKJERVEN MORRILL
MACPHERSON LLP

25 METRO DRIVE
SUITE 700
SAN JOSE, CA 95110
(408) 453-7200

³ Claims 63 - 65 were cancelled in the 22 December 2000 amendment and are not discussed further herein.

indicated as being allowable if rewritten in independent form, Claim 1 now provides that the shutter strips constitute "parts of a liquid-crystal structure in which liquid-crystal material comprises host cholesteric liquid crystal and guest black dichroic dye" and that "part of the liquid-crystal material" is "present in each shutter strip and", as specified in original Claim 48, has "a cholesteric twist whose twist pitch is no more than 5 μ m" when that shutter strip is in its light-absorptive state.

Taking note of the fact that Jones was applied against Claim 1, none of the art (including Waters) applied against the claims discloses a cholesteric liquid-crystal cell having a cholesteric twist pitch of 5 μ m or less. Accordingly, Claim 1 is patentable over all the applied art.

The same applies to independent Claim 57 which has been similarly amended to provide that the shutter strips constitute "parts of a liquid-crystal structure in which liquid-crystal material comprises host cholesteric liquid-crystal and guest black dichroic dye" and that "part of the liquid-crystal material" is "present in each shutter strip and, when that shutter strip is in its light-absorptive state," has "a cholesteric twist whose twist pitch is no more than 5 μ m". Accordingly, Claim 57 includes the further limitation of Claim 48. Claim 57 is therefore patentable over all the applied art on the same basis as Claim 1.

Claims 2 - 4, 6 - 40, 42, 44, and 53 - 56 all depend (directly or indirectly) from Claim 1. The same applies to new Claim 131. Claims 58 and 59 both depend from Claim 57. New Claims 132 - 134 also depend from Claim 57. Accordingly, Claims 2 - 4, 6 - 40, 42, 44, 53 - 56, 58, 59, and 131 - 134

LAW OFFICES OF
SKJERVEN MORRILL
MACPHERSON LLP

25 METRO DRIVE
SUITE 700
SAN JOSE, CA 95110
(408) 453-9200

are patentable over the applied art for the same reasons as Claims 1 and 57.

Claims 46, 47, and 49 - 52 which have been indicated as being allowable if rewritten in independent form likewise all depend (indirectly) from Claim 1. As a consequence, Claims 46, 47, and 49 - 52 are allowable in their current form.

With respect to dependent Claims 7 - 9, 15, and 17 - 19 against which only Jones has been applied, reasons were presented on pages 14 - 20 of the 22 December 2000 amendment as to why these seven claims are separately patentable over Jones. Those reasons are, for simplicity, incorporated by reference here. The Examiner has presented nothing to rebut the reasons presented on pages 14 - 20 of the 22 December 2000 amendment. Hence, Claims 7 - 9, 15, and 17 - 19 are separately allowable over Jones for those reasons.

As to dependent Claims 36 - 39 against which Jones and Curtin 790 have been applied, reasons were presented on pages 23 - 25 of the 22 December 2000 amendment as to why these four claims are separately patentable over Jones and Curtin 790. The reasons presented on pages 23 - 25 of the 22 December 2000 amendment are, for simplicity, incorporated by reference here. The Examiner has not presented anything to rebut those reasons. Accordingly, Claims 36 - 39 are separately allowable over Jones for the reasons presented on pages 23 - 25 of the 22 December 2000 amendment.

Subject to deleting the limitation that "largely all of the image part produced by the light provided by each imaging line" is "displayed largely simultaneously at any time when that image part is being displayed", each of independent

LAW OFFICES OF
SKJERVEN MORRILL
MACPHERSON LLP

25 METRO DRIVE
SUITE 700
SAN JOSE, CA 95110
(408) 453-9200

Claims 125 and 127 has been amended in the same manner as Claim 1. As a consequence, each of Claims 125 and 127 recites that the shutter strips constitute "parts of a liquid-crystal structure in which liquid-crystal material comprises host cholesteric liquid crystal and guest black dichroic dye" and that "part of the liquid-crystal material" is present in each shutter strip and, when that shutter strip is in its light-absorptive condition," has "a cholesteric twist whose twist pitch is no more than 5 μ m. Claims 125 and 127 are therefore patentable over the applied art for the same reasons as Claim 1.

Claim 126 depends from Claim 125. The same is true for new dependent Claims 135 and 136. New dependent Claims 137 and 138 both depend from Claim 127. Hence, Claims 126 and 135 - 138 are patentable over the applied art on the same basis as Claims 125 and 127 and thus on the same basis as Claim 1.

Claim 128 depends from Claim 127. Jones and Bird have been applied against Claim 128. However, as indicated above, none of the applied art, including Bird, discloses a cholesteric twist pitch of 5 μ m or less. Consequently, Claim 128 is patentable over the applied art on the same basis as Claim 127 and thus likewise on the same basis as Claim 1.

As to independent Claim 66 against which Jones and Bird have been applied, Claim 66 specifies that the display includes ⁽¹⁾ "a control component that utilizes light in causing the shutter strips to be selectively placed in their light-transmissive and light-absorptive states". Such a technique for controlling the shutter strips is, of course, not disclosed or suggested in Jones. Bird discloses an electro-optical device in which photosensitive elements 11 on

substrate 6 access elements 8 on substrate 6 in response to light supplied to photosensitive elements 11 from display elements 5' on substrate 2. However, nothing in Jones or Bird would provide a person skilled in the art with any motivation or suggestion for applying the teachings of Jones to that of Bird in such a way as to obtain the subject matter of Claim 66.

In particular, Bird employs light to control individual elements 8. Nowhere does Bird mention, or in any way suggest, utilizing light to control components, such as shutter strips, that provide a light-blocking function. As to Jones, nothing in Jones suggests that it would be advantageous to control the switching of the shutter strips through use of light. For this reason, a person skilled in the art would find no incentive for combining Jones and Bird in the manner proposed by the Examiner. Accordingly, Claim 66 is patentable over Jones and Bird.

Claims 67 - 98 and 115 - 124 all depend (directly or indirectly) from Claim 66. To the extent that any references besides Jones and Bird have been applied against dependent Claims 67 - 98 and 115 - 124, none of these references, in combination with Jones or/and Bird, would lead a person skilled in the art to the concept of using light to control shutter strips. Accordingly, Claims 67 - 98 and 115 - 124 are patentable over the applied art for the same reasons as Claim 66.

Claims 99 - 114, which have been indicated as being allowable if rewritten in independent form, similarly all depend (indirectly) from Claim 66. Hence, Claims 99 - 114 are allowable in their current form.

LAW OFFICES OF
SKJERVEN MORRILL
MACPHERSON LLP

25 METRO DRIVE
SUITE 700
SAN JOSE, CA 95110
(408) 453-9200

As to dependent Claims 74, 76 - 78, 84, and 85 against which Jones and Bird have been applied, reasons were presented on pages 14 - 16, 19, and 20 of the 22 December 2000 amendment as to why these six claims are separately patentable over Jones. These reasons are, for simplicity, incorporated by reference here. The Examiner has presented nothing to rebut the reasons presented on pages 14 - 16, 19, and 20 of the 22 December 2000 amendment. Bird does not disclose or suggest the further limitation of any of these six dependent claims. Claims 74, 76 - 78, 84, and 85 are thus separately patentable over all the applied art, including Jones and Bird.

Turning to dependent Claims 120 - 123 against which Jones, Bird, and Curtin 790 have been applied, reasons were presented on pages 23 - 25 of the 22 December 2000 amendment as to why these four claims are separately patentable over Jones and Curtin 790. The reasons presented on pages 23 - 25 of the 22 December 2000 amendment are incorporated by reference here. The Examiner has presented nothing to rebut those reasons. Bird does not disclose or suggest the further limitation of any of these four claims. Accordingly, Claims 120 - 123 are separately allowable over the applied art, including Jones and Bird.

Dependent Claim 7, as originally presented, has been rewritten in independent form as new Claim 139. Consequently, Claim 139 requires that each shutter strip be "in its light-transmissive state largely when each activated imaging line associated with that strip is essentially fully black" during display operation.

In regard to Claim 7 against which Jones has been applied, the Examiner alleges that Jones "teaches a shutter

LAW OFFICES OF
SKJERVEN MORRILL
MACPHERSON LLP

25 METRO DRIVE
SUITE 700
SAN JOSE, CA 95110
(408) 453-9200

strip/segment in its light-transmissive state when the activated image line/cell associated with that strip is dark (column 4, lines 54-59)". This is incorrect. The portion of Jones parenthetically cited by the Examiner deals with the projection display of Figs. 1a and 1b having a non-segmented screen but no shutter. Consequently, the cited portion of Jones does not disclose the limitation of Claim 139 that each shutter strip be "in its light-transmissive state largely when each activated imaging line associated with that strip is essentially fully black". As far as applicants' attorney can determine, nowhere else does Jones disclose this limitation.

Nor does any of the other applied art appear to disclose or suggest the preceding limitation of Claim 139. Consequently, Claim 139 is patentable over the applied art. The same applies to new Claim 140 since it depends from Claim 139.

Dependent Claim 8, as originally presented, has been rewritten in independent form as new Claim 141. Hence, Claim 141 requires that "a variable selectable plurality of consecutive ones of the shutter strips" be "simultaneously in their light-transmissive states when at least one other of the shutter strips is in its light-absorptive state" during display operation.

Regarding Claim 8 against which Jones has been applied, the Examiner states that Jones "teaches a shutter in front of the imaging cell comprising a plurality of segments being switchable synchronously between a transparent state and a light absorbing state (column 3, lines 14-28)". The Examiner's statement appears to deal with the shuttered backlit display shown in Fig. 10b of Jones and described

LAW OFFICES OF
SKJERVEN MORRILL
MACPHERSON LLP

25 METRO DRIVE
SUITE 700
SAN JOSE, CA 95110
(408) 453-9200

further at col. 7, lines 10 - 29.

The Examiner's statement about the shuttered backlit display seems correct. However, Claim 141 specifies that a variable selectable plurality of consecutive ones of the shutter strips, i.e., multiple consecutive shutter strips, are simultaneously in their light-transmissive states when at least one other shutter strip is in its light-absorptive state. As far as Applicants' attorney can determine, Jones does not disclose that multiple strips of the shutter in the display of Fig. 10b are simultaneously in their light-transmissive states at any time. Nor does Jones appear to disclose that multiple segments of the segmented shutter in any of Jones' other segmented-shutter displays, e.g., the display of Fig. 9 or 11, are simultaneously in their light-transmissive states at any time.

None of the other applied art appears to disclose or suggest the limitation of Claim 141 that a variable selectable plurality of consecutive shutter strips be simultaneously in their light-transmissive states when at least one other shutter strip is in its light-absorptive state. For this reason, Claim 141 is separately patentable over the applied art. New Claims 142 and 143 are likewise patentable over the applied art since they depend from Claim 141.

Claim 142 repeats the further limitation of dependent Claim 9 that "the selectable plurality of shutter strips are simultaneously in their light-transmissive states when a variably selectable one of the imaging lines associated with that plurality of shutter strips is activated and each other imaging line associated with that plurality of shutter strips is deactivated". In other words, Claim 142 covers the

LAW OFFICES OF
SKJERVEN MORRILL
MACPHERSON LLP

25 METRO DRIVE
SUITE 700
SAN JOSE, CA 95110
(408) 453-9200

situation in which multiple, i.e., two or more, shutter strips are simultaneously in their light-transmissive states even though only one imaging line associated with those shutter strips is activated.

Regarding Claim 9 against which Jones has been applied, the Examiner states that Jones "teaches an embodiment of his invention whereby the screen need not switch entirely all at once but many do so in segments (column 5, lines 43-44), and is synchronously switchable such that the front layer is in its transparent state when the projector is projecting an image and in its dark state when the projector is not (column 5, lines 11-24)" and that "This is inherently similar to applicant's claim of display wherein plurality of the shutter strips are simultaneously in their light-transmissive states when activated while the other associated imaging lines are deactivated". The portions of Jones parenthetically cited by the Examiner deal with a display lacking a shutter and thus are not on point for Claim 9 and, accordingly, are not on point for Claim 142.

Even if the Examiner were to cite a portion of Jones dealing with a display having a segmented shutter, Jones still does not disclose the limitation of Claim 142 that multiple shutter strips be simultaneously in their light-transmissive state when only one imaging line associated with those shutters strips is activated. Consequently, Claim 142 is separately patentable over Jones. Claim 142 is also separately patentable over the other applied art.

Dependent Claim 15, as originally presented, has been rewritten in independent form as new Claim 144. Accordingly, Claim 144 requires that "one of the shutter strips" be "in its

LAW OFFICES OF
SKJERVEN MORRILL
MACPHERSON LLP

25 METRO DRIVE
SUITE 700
SAN JOSE, CA 95110
(408) 453-9200

light-transmissive state while the selection signal for each imaging line associated with that shutter strip is not at that selection signal's selection condition". Jones, which was applied against Claim 15, does not disclose or suggest this limitation. Nor is this limitation disclosed in any of the other applied art. Hence, Claim 144 is patentable over the applied art. The same applies to Claim 145 since it depends from Claim 144.

Dependent Claim 17, as originally presented, has been rewritten in independent form as new Claim 146. As a result, Claim 146 requires that the control component comprise "a group of control elements for selectively providing light that determines placement of the shutter strips in their light-transmissive and light-absorptive states".

With respect to Claim 17 against which Jones has been applied, the Examiner states that "it is inherent the switching means comprises control elements which facilitates the placement of the shutter in their light-transmissive and light-absorptive states". By "switching means", the Examiner is presumably referring to certain of Jones' synchronizer switches. While synchronizer switches 48, 54, and 60 in the displays of Figs. 9, 10a, and 11 of Jones may contain multiple switching elements that function as control elements for synchronizing the switching, Claim 17, and thus Claim 146, require that the control elements provide light which controls the switching of each shutter strip.

None of the synchronizer switches in the displays of Figs. 9, 10a, and 11 of Jones or in any of Jones' other displays having segmented shutters appears to utilize light in synchronizing the shutter switching. Consequently, none of

the synchronizer switches in any of Jones' shuttered displays appear to provide light in the manner specified in Claim 146. For the reasons presented above in connection with independent Claims 66, it would not be obvious to apply the teachings of Bird to Jones or/and any of the other applied art in an effort to reach the full subject matter of Claim 146. This claim is therefore patentable over Jones and the other applied art. Claims 147 - 149 are likewise patentable over the applied art since they depend from Claim 146.

New Claim 150 is an independent claim which repeats original independent Claim 1 subject to the further limitation that the image-producing component comprises "one of (a) a light-emitting diode display, (b) a combination of a liquid-crystal device and a phosphor-based light-emitting device which selectively emits light when excited by light provided by the liquid-crystal device, and (c) a combination of a light providing portion, an electron-emitting portion which emits electrons upon being excited by light furnished by the light-providing portion, and a phosphor-based light-emitting device which selectively emits light when struck by electrons emitted by the electron-emitting portion". These three implementations of the image-producing component were originally recited in Claim 34 against which Jones and Curtin 790 have been applied.

Neither Jones nor Curtin 790 discloses an image-producing component implemented in any of the three ways recited in Claim 150. Even if it were reasonable to combine Jones and Curtin 790 in the manner proposed by the Examiner, the combination would not teach the full subject matter of Claim 150. Nor does any of the other applied art disclose or suggest the full subject matter of Claim 150. For this

LAW OFFICES OF
SKJERVEN MORRILL
MACPHERSON LLP

25 METRO DRIVE
SUITE 700
SAN JOSE, CA 95110
(408) 453-9200

reason, Claim 150 is patentable over the applied art. The same applies to Claims 151 - 154 since they depend from Claim 150.

In short, Claims 1 - 4, 6 - 40, 42, 44, 54 - 59, 66 - 98, and 115 - 154 have been shown to be patentable over the applied art. Claims 46, 47, and 49 - 52 are allowable in their present form. Accordingly, Claims 1 - 4, 6 - 40, 42, 44, 46, 47, 49 - 52, 54 - 59, and 66 - 154 should be allowed so that the application may proceed to issue.

Please telephone applicants' attorney at 408-452-9200, ext. 1371, if there are any questions.

EXPRESS MAIL LABEL NO.

EL 901 567 596 US

Respectfully submitted,

Ronald J. Meetin

Ronald J. Meetin
Attorney for Applicants
Reg. No. 29,089

LAW OFFICES OF
SKJERVEN MORRILL
MACPHERSON LLP

25 METRO DRIVE
SUITE 700
SAN JOSE, CA 95110
(408) 453-9200

APPENDIX

CLAIMS 1, 42, 44, 46, 49 - 51, 54, 57, 97, 98, 125, AND 127,
WITH ANNOTATIONS TO INDICATE REVISIONS,
OF U.S. PATENT APPLICATION 09/307,044

1. (Twice amended) A display comprising:

an image-producing flat-panel component having a multiplicity of imaging lines for producing an image, each imaging line being regularly updated to provide light that produces part of the image[, largely all of the image part produced by the light provided by each imaging line being displayed largely simultaneously at any time when that image part is being displayed]; and

a set of shutter strips, each (a) associated with at least one of the imaging lines, (b) situated in front of each so-associated imaging line outside the image-producing component, and (c) being switched during operation of the display between a light-transmissive state and a light-absorptive state such that each shutter strip is in its light-transmissive state at least partly while each imaging line associated with that strip is providing light for creating the image, the shutter strips constituting parts of a liquid-crystal structure in which liquid-crystal material comprises host cholesteric liquid crystal and guest black dichroic dye, part of the liquid-crystal material being present in each shutter strip and, when that shutter strip is in its light-absorptive state, having a cholesteric twist whose twist pitch is no more than 5 μ m.

42. (Amended) A display as in Claim 1 [41] wherein the [liquid-crystal structure contains] liquid-crystal material is capable of being controlled to selectively transmit an image

defined by unpolarized light incident on the liquid-crystal material.

44. (Amended) A display as in Claim 1 [43] where the guest black dichroic [pleochroic] dye comprises long molecules which roughly align with long molecules of the host cholesteric liquid crystal [liquid-crystal material].

46. (Amended) A display as in Claim 1 [45] wherein the cholesteric twist of each [part of the liquid-crystal material is present in each shutter strip and, when that] shutter strip [is] in its light-absorptive state is [, has a cholesteric twist of] at least 180°.

49. (Amended) A display as in Claim 1 [48] wherein the twist pitch of each shutter strip in its light-absorptive state is no more than 3 μm .

50. (Twice Amended) A display as in Claim 1 [48] wherein the liquid-crystal material is no more than 10 μm in thickness.

51. (Amended) A display as in Claim 1 [46] wherein the black dichroic dye has a concentration of 0.1 - 10 wt % in the host cholesteric liquid crystal [liquid-crystal material].

54. (Amended) A display as in Claim 1 [41] wherein each shutter strip in the liquid-crystal structure includes [comprises]:
a different corresponding one of a set of laterally separated first electrical conductors; and
a portion, situated opposite the corresponding first conductor, of a second electrical conductor spaced apart from the

first conductor[; and], part of the liquid-crystal material being situated between the corresponding first conductor and the portion of the second conductor.

57. (Twice amended) A display comprising:

an image-producing component having a multiplicity of imaging lines for producing an image, each imaging line being regularly updated to provide light that produces part of the image, largely all of each such image part being displayed largely simultaneously at any time when that image part is being displayed; and

a set of shutter strips, each (a) associated with at least one of the imaging lines, (b) situated in front of each so-associated imaging line outside the image-producing component, and (c) being switched during operation of the display between a light-transmissive state and a light-absorptive state such that each shutter strip is in its light-transmissive state at least partly while each imaging line associated with that strip is providing light for creating the image, the shutter strips constituting parts of a liquid-crystal structure in which liquid-crystal material comprises host cholesteric liquid crystal and guest black dichroic dye, part of the liquid-crystal material being present in each shutter strip and, when that shutter strip is in its light-absorptive state, having a cholesteric twist whose twist pitch is no more than 5 μm .

97. (Amended) A display as in Claim 96 wherein the liquid-crystal material comprises:

host liquid crystal [liquid-crystal material]; and

guest pleochroic dye having selectively presentable largely black and largely transparent appearance conditions.

98. (Amended) A display as in Claim 96 wherein:

the host liquid crystal [liquid-crystal material] comprises cholesteric liquid crystal; and

the guest pleochroic dye comprises black dichroic dye.

125. (Twice amended) A method comprising the following steps for manufacturing a flat-panel display:

forming an image-producing flat-panel component having a multiplicity of imaging lines for producing an image such that each imaging line is regularly updatable to provide light that produces part of the image [and such that largely all of the image part produced by the light provided by each imaging line is displayed largely simultaneously at any time when that image part is being displayed];

forming a shutter comprising a set of shutter strips that constitute parts of a liquid-crystal structure in which liquid-crystal material comprises host cholesteric liquid crystal and guest black dichroic dye; and

placing the shutter over the image-producing component so that each shutter strip is (a) associated with at least one of the imaging lines, (b) situated in front of each so-associated imaging line outside the image-producing component, and (c) switchable during display operation between a light-transmissive state and a light-absorptive state such that each shutter strip is in its light-transmissive state at least partly while each imaging line associated with that strip is providing light for creating the image, part of the liquid-crystal material being present in each shutter strip and, when that shutter strip is in its light-absorptive state, having a cholesteric twist whose twist pitch is no more than 5 μm .

127. (Twice amended) A method comprising the steps of:
producing an image by regularly updating each of a
multiplicity of imaging lines of an image-producing flat-panel
component to provide light that produces part of the image [such
that largely all of the image part produced by the light provided
by each imaging line is displayed largely simultaneously at any
time when that image part is being displayed]; and

switching each of a set of shutter strips, each associated
with at least one of the imaging lines and being situated in front
of each so-associated imaging line outside the image-producing
component, between a light-transmissive state and a light-
absorptive state such that each shutter strip is in its light-
transmissive state at least partly while each imaging line
associated with that strip is providing light for creating the
image, the shutter strips constituting parts of a liquid-crystal
structure in which liquid-crystal material comprises host
cholesteric liquid crystal and guest black dichroic dye, part of
the liquid-crystal material being present in each shutter strip
and, when that shutter strip is in its light-absorptive state,
having a cholestic twist whose twist pitch is no more than 5 μm .